

GEEL 2000 Language Schools



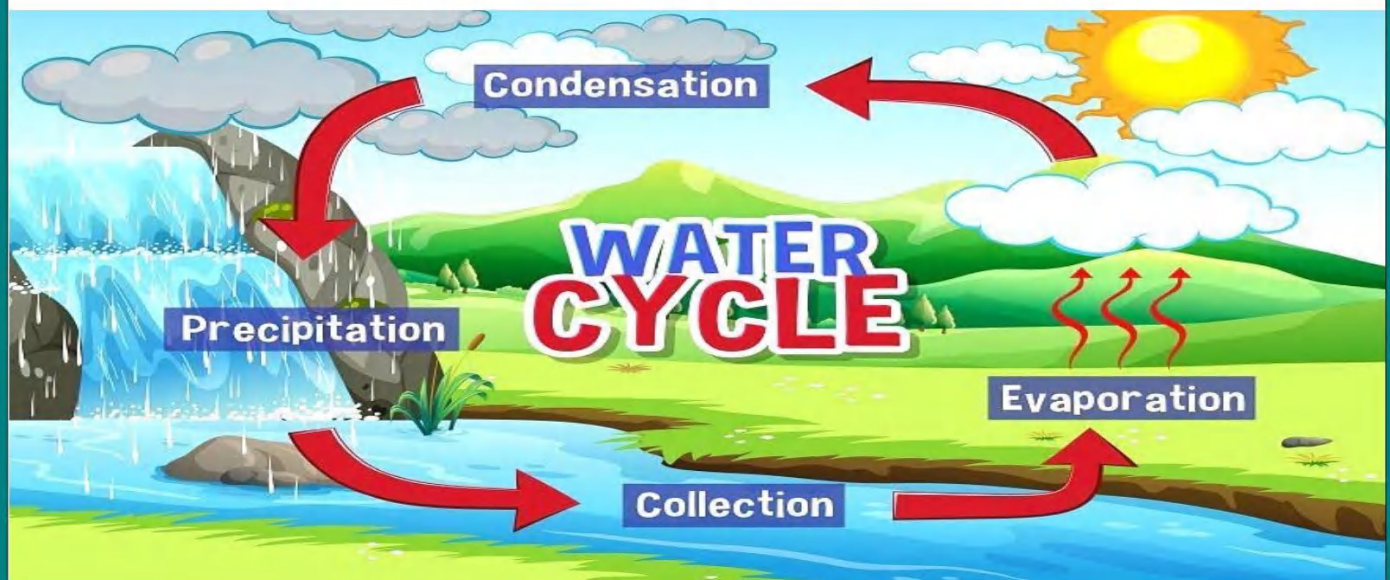
Primary (6), Unit (1), part (1)



Second term



Concept (3.1, 3.2)



Name:.....

Class:.....1.....

Concept (3.1) Lesson (1)

Energy transfer through the water cycle



Water exists in 3 states in nature:

Solid (ice)	Liquid (water)	Gas (water vapor)
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Water changes from one state to another when it gains or loses energy.

Sun	Water
Transfers thermal energy to the water in the puddle.	Heats up and evaporates into water vapor so the small puddle is dried and disappeared .

Example:- when the water of the small puddle is heated.

Give reason for:

The sun is the most important source of energy that drives the water cycle.

Because energy of the sun is needed for:

- 1) Melting ice into liquid water.
- 2) Evaporation of liquid water into water vapor.
- 3) Generating the wind movement which causes ocean currents that transport water to different locations on Earth.



Dropping water levels:

There was a large **salt lake** in Turkey that hosts huge number of flamingos.

This lake becomes a small puddle and it **dries up** completely in **the summer**.

Note:

Scientists try to conserve and rehabilitate the ecosystem in this lake and protect it from climate changes.

Flamingos

Reproduction (breeding)	Food
Migrate to the lake and reproduce when the weather is <u>warm</u> .	Feed on <u>algae</u> that found in the shallow water of this lake.
	

Give reason for:



1-Increasing or decreasing the level of water in some lakes.

- Due to energy transfer in water cycle.

2-The energy transfer in water cycle lead to drought in lakes.

-Due to the increase in the evaporation of the lake water in summer.

Energy transfer in the water cycle:

The water cycle is affected by 3 main processes :

1- Evaporation Process	2- Condensation process	3- Precipitation process
It is the process at which the matter changes from liquid state to gas state.	It is the process at which the matter changes from gas state to liquid state.	It is the process at which water falls on Earth in the form of rain, sleet, snow or hail (snow pellets).

After precipitation the water cycle can be affected by 2 steps:

1- Run off	2- Collection
It is the step in which water flows along the Earth's surface into the river and then into the ocean or sea.	It is the step in which rainwater falling on the Earth's surface is collected in different water bodies.

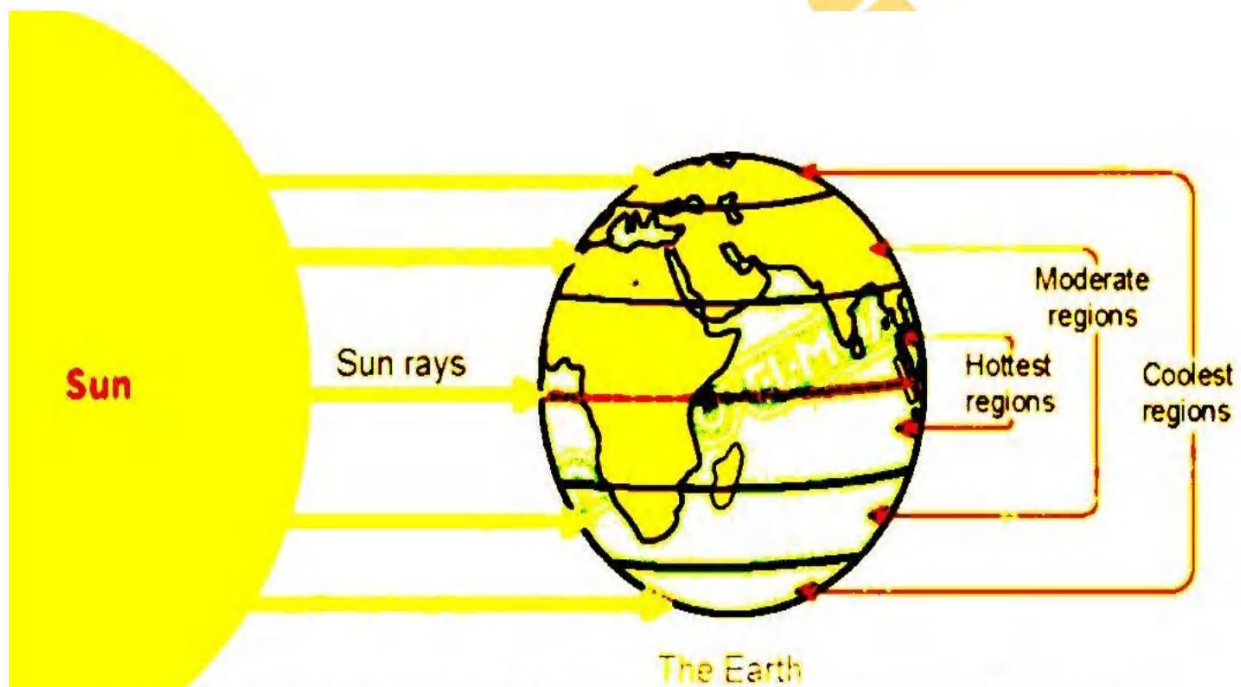
Distribution of solar energy:



The distribution of the solar energy on the Earth's surface plays an important role in evaporation process in the water cycle.

The regions on Earth's surface can be classified into:

Hottest regions	Moderate regions	Cooler regions
Evaporation process is the <u>greatest.</u>	Evaporation process is <u>moderate.</u>	Evaporation process is the <u>smallest.</u>



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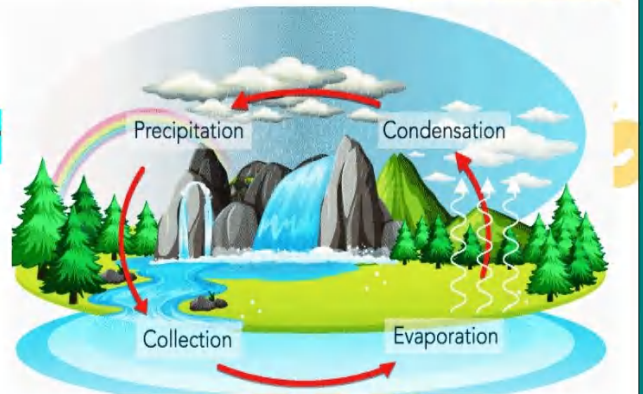
Concept (3.1)

Lesson (2)



Water cycle:

It's the continuous movement of water among different water reservoir .



Water reservoirs:

They are storage locations of water on earth.

Water reservoirs include:

- | | | | | |
|------------|---------------------|-----------|---------------|--------------|
| 1- Oceans. | 2- Rivers. | 3- Rocks. | 4- Seas | 5- Glaciers. |
| 6- Lakes | 7- Living organisms | 8- Soil | 9- Atmosphere | |

Note:

The water move among reservoirs through evaporation, condensation, precipitation, runoff and collection .

The factors affecting on water cycle:

- | | |
|--------------------|------------------|
| 1- Thermal energy. | 2- Gravity force |
|--------------------|------------------|

1- Thermal Energy:

- ☛ Sunlight (solar radiation) includes thermal energy.
- ☛ Thermal energy causes a change in the state of water in water cycle.





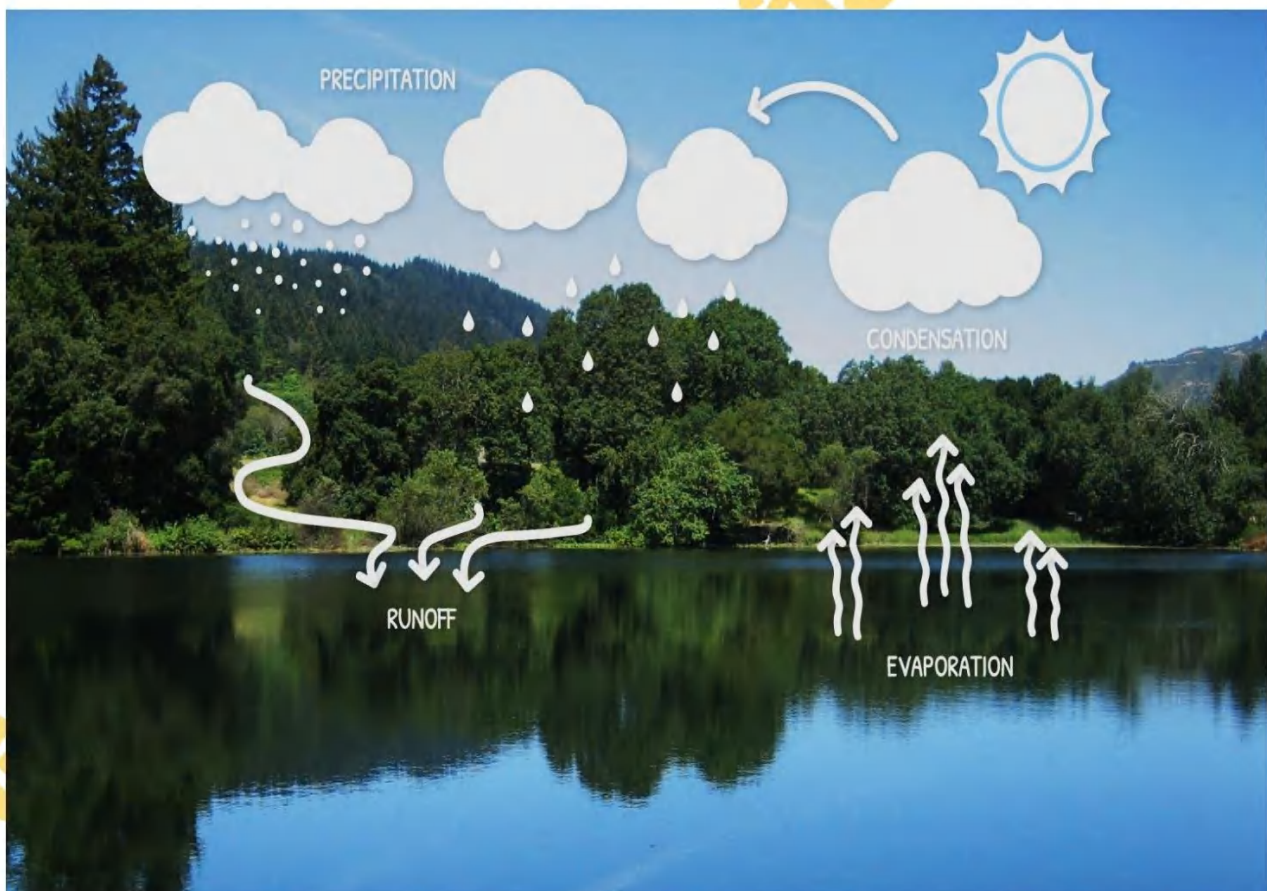
When water particles :



Gain (absorb) thermal energy	Lose (release) thermal energy
It will change from solid (ice) to liquid (water).	It will change from liquid (water) to solid (ice).
Melting, evaporation and transpiration (in plant leaves) will happen.	Condensation and freezing will happen.

2-Gravity Force:

- ✱ **Wind** is a type of **force** that affects the movement of water.
- ✱ The **main force** that affects the water cycle is **gravity**.



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Gravitational force



Gravity causes	Falling of <u>melting ice crystals</u> and <u>water droplets</u> found in clouds to the Earth's surface.	Flowing of ice in glaciers or water from <u>higher altitude area</u> (higher elevation) to <u>lower altitude area</u> (lower elevation).	<u>Leakage</u> of liquid water down into the ground then to groundwater reservoirs.
Leads to	Flowing of water <u>downhill</u> into streams and rivers towards larger water bodies.	<u>Frozen</u> water <u>melts</u> and flows into the ground or the water bodies.	

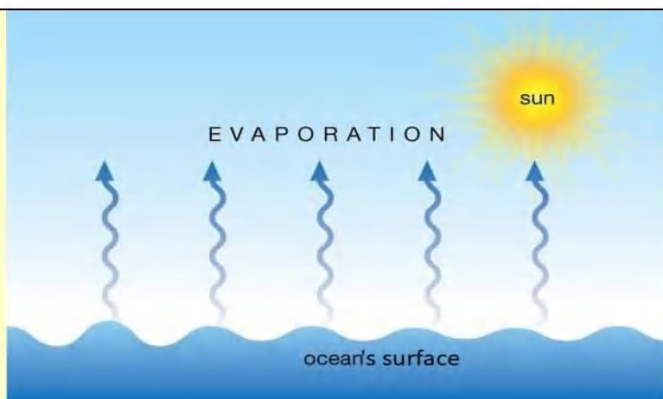
Energy and water cycle:

★ Gaining or losing energy affects the water molecules (particles) in the air.

★ The movement of air from one place to another in the presence of difference in temperature leads to

1- Evaporation	2- Condensation
Changing of <u>liquid</u> water to <u>water vapor</u> -Sun <u>heats</u> water in water cycle which lead to <u>evaporation</u> .	Changing of <u>water vapor</u> to <u>liquid</u> water (<u>water droplets</u>) -Air is saturated with water vapor <u>cools</u> due to decreasing of air temperature so water vapor changes to liquid water.





Evaporation



Condensation

Transpiration:

It is a type of evaporation that take place through the stomata on the plant's leaves .



Note:

- About **10%** of water vapor in the air comes from **transpiration** of plants.
- When the **amount of energy** comes from the sun **increases** ,the **transpiration** in plant's leaves **increases**.
- **Sunlight** affects the **amount of transpiration** of plants, when the amount of the **energy** comes from the sun **increases**, the **transpiration** in plant's leaves **increases**.

Transpiration



How clouds are formed?

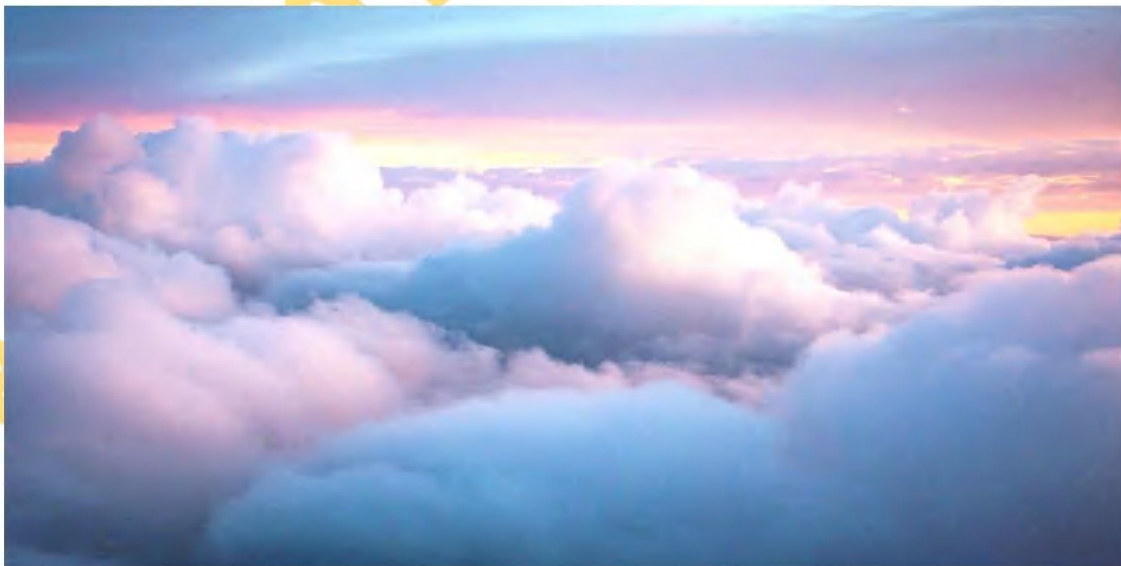


- 1- Clouds are formed due to condensation of water vapor into water droplets that attach to particles of dust, smoke in the air.
- 2- When large numbers of water droplets join together, they form clouds



Note:

- Clouds are made up of millions of tiny water droplets, when these water droplets become too heavy, they fall in the form of rain.



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Concept (3.1) Lesson (3)

The importance of water:

✦ All living organisms need fresh water to survive, the plants depend on rain to grow.

✦ Water cycle provides water for all living organisms and regulate the weather.

Convection :

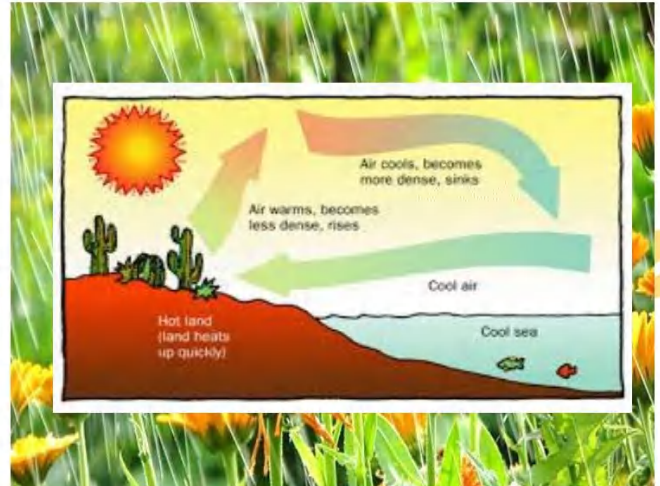
The process in which heat transfers in liquids and gasses, where hot molecules (less density) rise upward, while colder molecules (more density) fall down.

Notes:

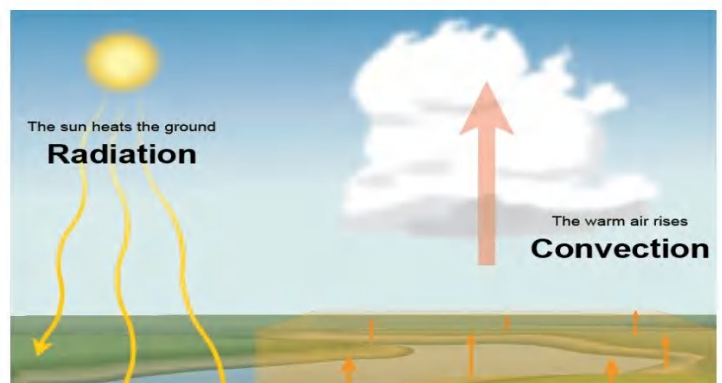
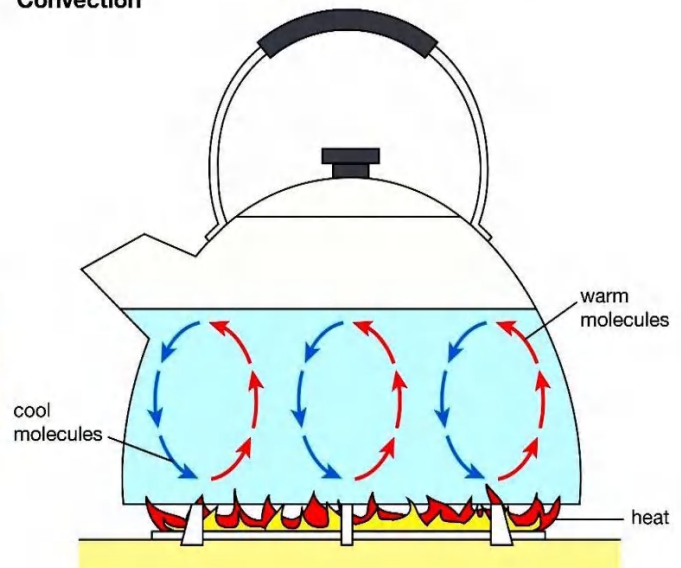
The heat of the sun transfers from space to Earth by radiation.

The heat can transfer through Earth's atmosphere by convection in the form of convection currents.

convection currents in Earth's atmosphere help in determining the regional climate.



Convection

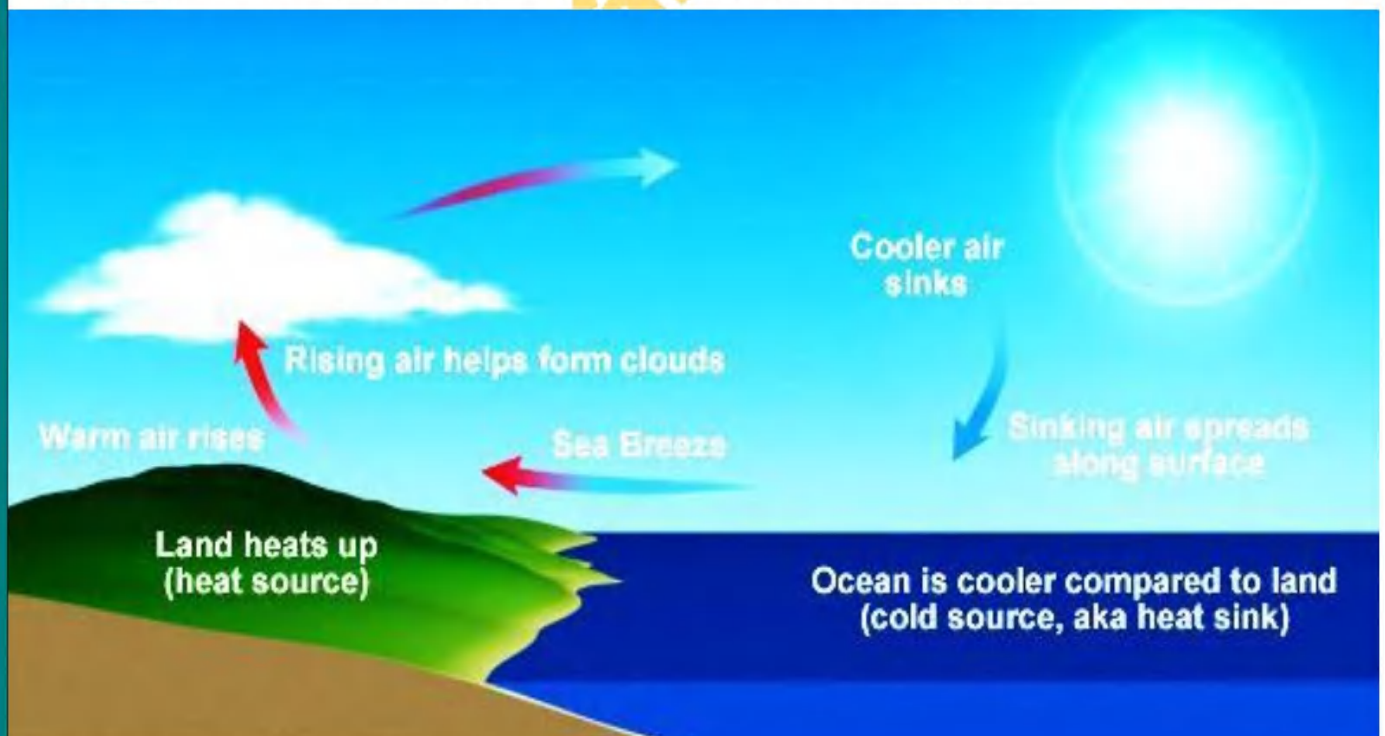




Convection in liquids and gasses



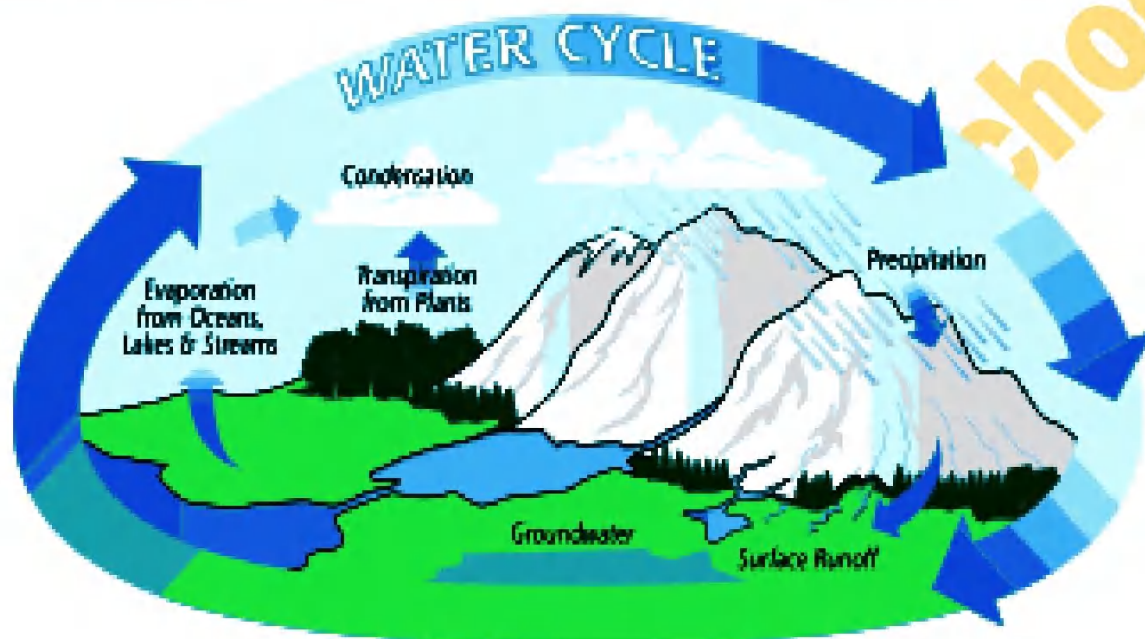
- ✱ When a liquid or gas is heated, it expands and becomes less dense (light), so it risers upward.
 - ✱ The cold liquid or gas is more dense ,so it moves downward and replaces the warm one.
 - ✱ The movement of warm and cold liquid or gas form cycle of convection currents.
 - ✱ Gravity helps in rising and falling of liquids and gases which leads to rotating the convection currents causing formation of wind and ocean currents.
- And it affects the movement of water in water cycle.



Notes:

Convection currents in Earth's atmosphere help in determining the regional climate.

Relation between convection and condensation



- ★ Convection causes the raising of temperature of air that contains water vapor
- ★ Condensation happens when this raising air loses its heat and the cold water vapor changes into water droplets and finally form clouds.

Note:

Condensation and freezing occur when water particles lose thermal energy, while evaporation, melting and transpiration occur when water particles gain thermal energy.

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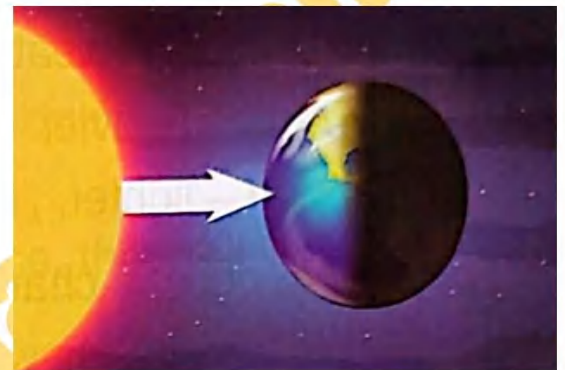


The heating of Earth

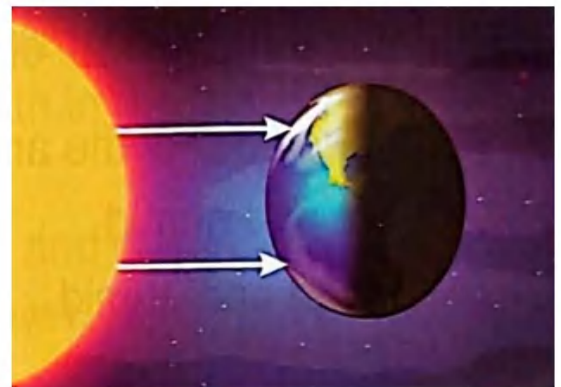


- ★ Getting closer or moving away from the equator affects the weather.
- ★ Area near the equator is hot and humid, as we move away to north or south of the equator depends on temperature and precipitation at these areas where the weather could be warm and humid or freezing cold.

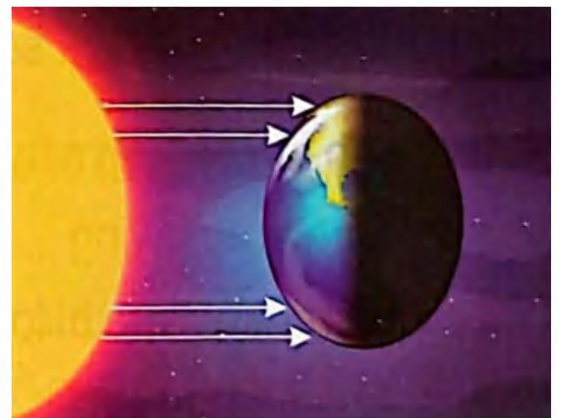
★ When sun rays fall perpendicular on Earth's surface in the area near equator, the rays are concentrated on a small area and giving high effect of heat, so weather will be hot.



★ When sun rays fall semi-inclined (semi-slanted), (low effect of heat), the weather will be warm.

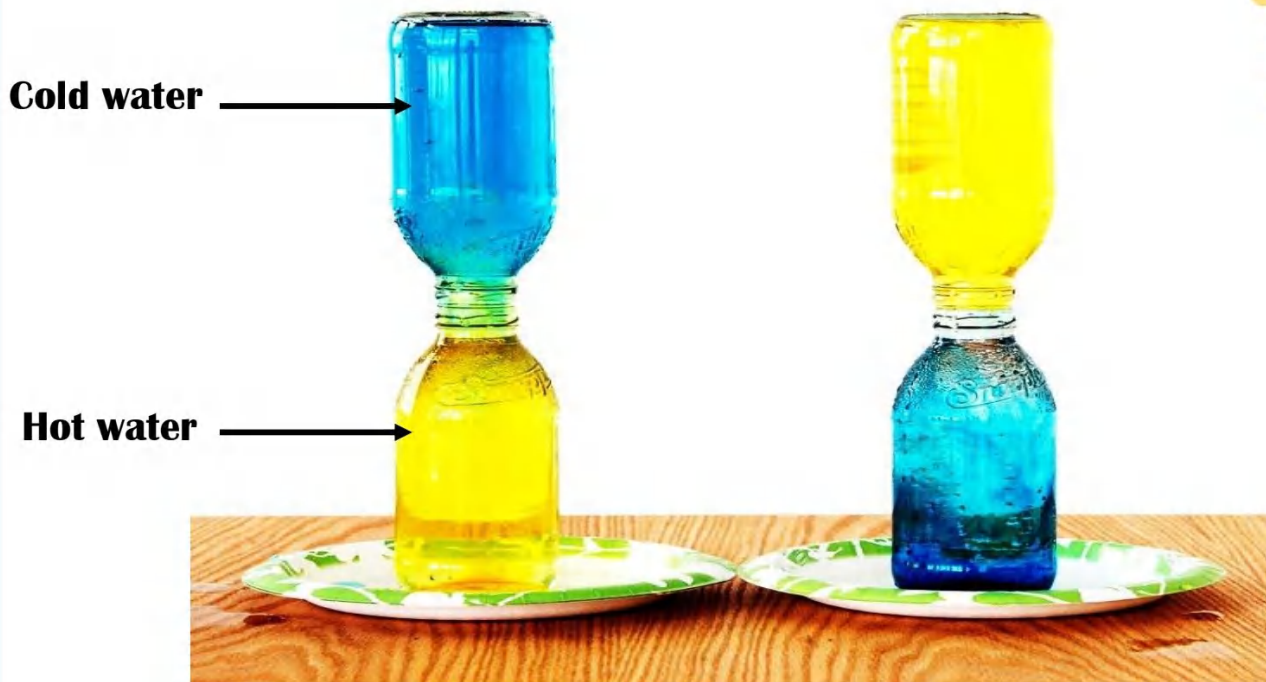


★ When sun rays fall very inclined (slanted) (lowest effect of heat), so the weather is very cold.



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Convection currents and the water cycle



- Mixing blue and yellow colors
produce green color

- Convection currents and gravity
force affect the movement of water
through the water cycle.



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Wind is the main factor in determining weather, so change in wind causes change in weather.

- ★ Wind carries heat, moisture, rain, snow, dust, sand ,.....
- ★ Earth has a global wind system that consists of winds below in a constant direction over a long periods of time.
- ★ Unequal heating of the Earth between the poles and equator generates wind.
- ★ Wind helps in transporting water through water cycle by carrying water vapor or by forming of ocean currents.



Factors affecting wind direction:

- 1- Amount of solar radiation that reaches the Earth.
- 2- Rotation of Earth.





Wind forms by movement of warm air which rises up and it is replaced by cooler air.

★ If the warm air contains enough amount of water vapor during its rising, water vapor condenses and the air loses this water in form of rain.



★ At the same time cooler air replaces the rising warm air, so warm air cools and descends.

★ By the time, it reaches the Earth's surface again and it becomes dry.

★ The dry air forms a group of dry deserts around the Earth, then air flows back again to the same place.



What happens if there is no wind on Earth?

1- Some ecosystems will change completely and others may disappear.

2- The regions around the equator become very hot and poles will completely freeze.



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Concept (3.2) , Lesson (1)

Heat and weather changes



The reasons of change in weather:-

- 1- The density of cold and dry air is more than that of hot and humid air
- 2- When a part of air becomes hot and humid by the heat of sun.
- 3- When the hot and humid air meet the cold and dry air, the hot air rises and becomes colder, this coldness causes water vapor in hot air to condense then the rain falls.

Give reason:

***Hot air moves up while cold air moves down.**

Because the density of cold and dry air is more than hot and humid air.

Meteorologist

The scientist who uses a variety of tools and instruments to study and forecast weather.

Give reason:

Sometimes people prefer to live in desert than in cities.

-Due to fast population growth in cities.

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Farmers use new ways to make the soil of desert fertile and fruitful such as:

- 1-They improve the soil quality.
- 2-They plant crops that are able to grow in the hot climate and low fertility soil.
- 3-They use new ways to irrigate crops such as reusing water.
- 4- They use wind and the Sun to power their farms in desert with wind turbines or solar energy.



Give reason:

Desert farming faces many difficulties.

Because the desert's climate is hot and the amount of water is small.

Note:

- ★ Deserts receive about 250 millimeters of rain per year.
- ★ In desert more water evaporates than that falls by precipitation.

MOUNTAIN RANGES AT COASTAL REGIONS HAVE TWO SIDES:

- * Wet side that faces the coast.
- * Dry side that is away from the coast.



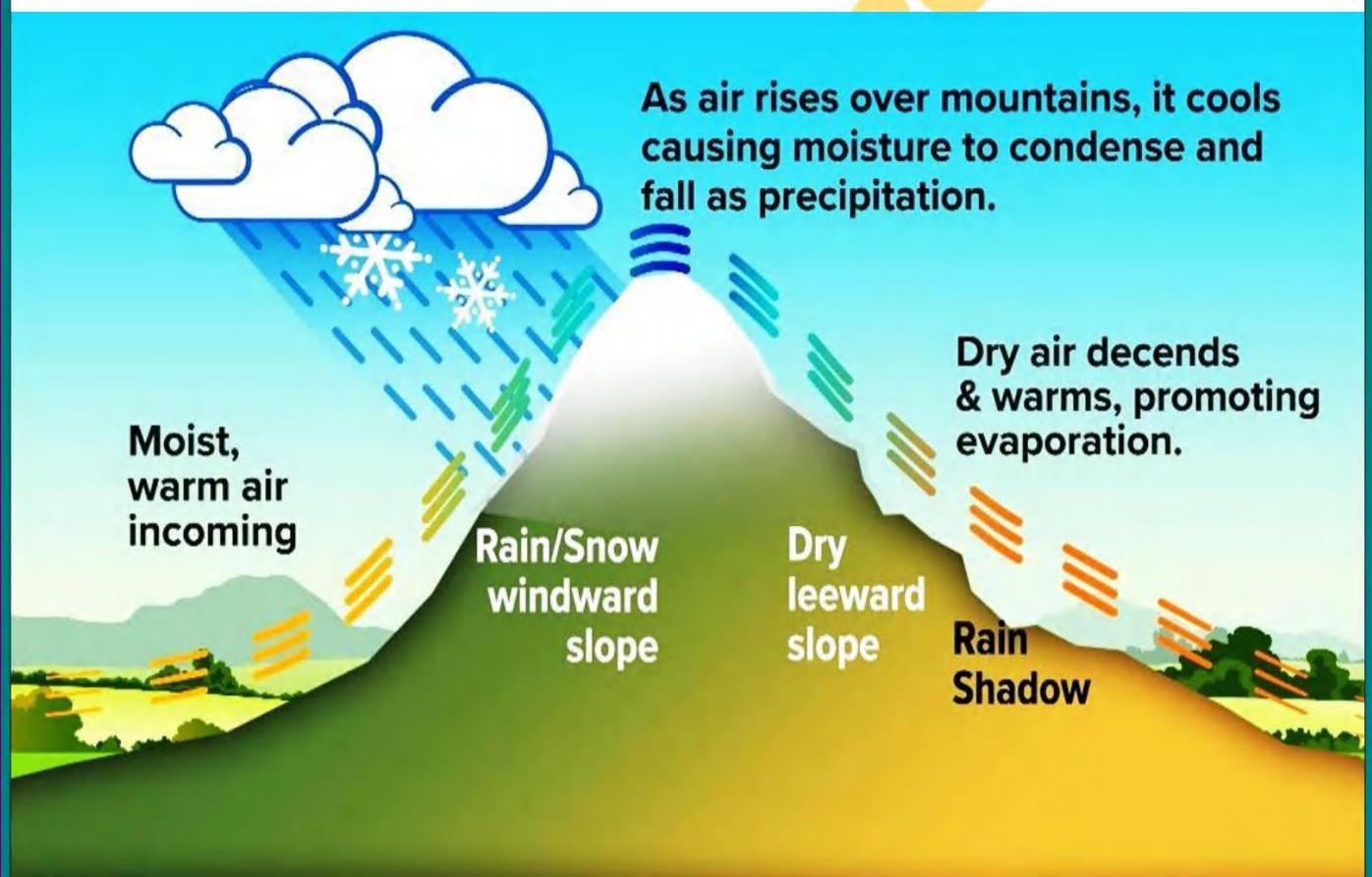
Rain shadow phenomenon:-

At the wet side that faces the coast:

When warm and humid air encounters (faces) this side of mountain ranges this air rises and cools, then water vapor in the cold air condenses so the precipitation occurs.

At the dry side:

The air descends and becomes warm so the air dries the land of this side.



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Changes in the atmosphere

The properties	At the bottom of the mountain	At the top of the mountain
The atmospheric Pressure	High	Low
The air temperature	High	Low
The air density	High	Low

Note:

As we go from the bottom of the mountain to up.

Air (atmospheric pressure) decreases.

Air temperature decreases.

Air density decreases.

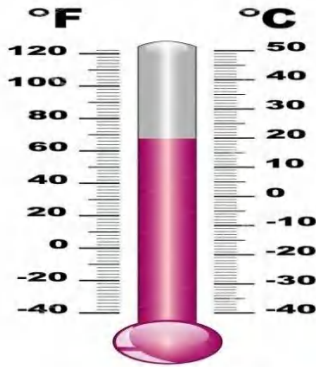


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Concept (3.2) , Lesson (2)



Meteorology	It is the science of studying and predicting the weather.
Meteorologist	The scientist who uses a variety of tools and instruments to study and forecast weather.
Thermometer	It is a device used to measure the temperature. 
Barometer	It is a device used to measure the atmospheric pressure. 
Atmospheric pressure	- It is the amount of force that air exerts on its surroundings. Or - It is the weight of the air above a certain area.
Humidity	It is the measure of how much water vapor is present in the air.



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Meteorologists: use some tools like **satellites** , **airplanes** and **weather balloons** to carry **measuring** instruments **high** into the **atmosphere** to measure conditions of weather from different altitudes .

Satellites and weather stations

↓ Have

Devices designed **transmit data**

↓ From

The satellite or station

↓ To

Meteorologists

Meteorologists try to **collect** a lot of **data** about (**air temperature** , **atmospheric pressure** , **wind** , **precipitation** , **humidity** and **other weather conditions**)

Analyzing
the data

- Meteorologists usually **use weather maps** : to collect data from different places and over short periods of time .
- **Mapping data** (mapping measurements) → means representing data on map (like air temperature , atmospheric pressure and humidity)
- **its function** : **allows meteorologists to see the important weather conditions such as the movement of air**

Putting it all
together

- Collecting and analyzing data about the atmosphere is just one part of predicting the weather .
- Meteorologists also need to **observe** some other **factors** that affect the atmosphere such as landforms .
- **use complex computer models (G.R) ?** to predict how these different factors will interact



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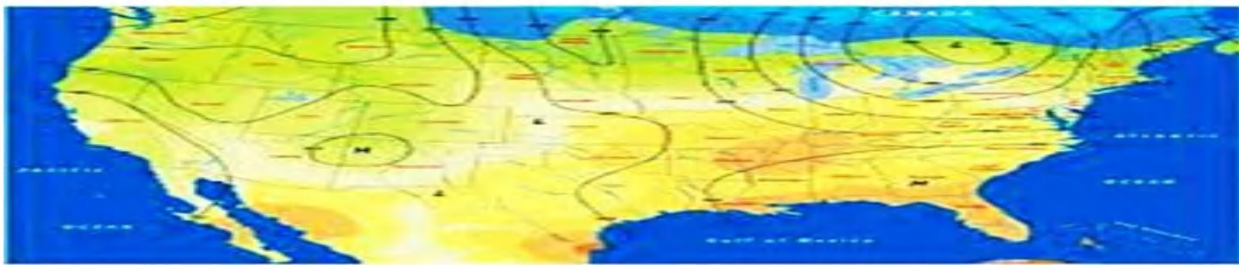




Weather forecasts can be uncertain for next days or weeks , where

- Some small unexpected changes in wind , air temperature or moisture in air
can affect next week's weather

- Sometimes unexpected and quickly changes happen in the weather conditions that makes meteorologists could not predict the weather of next days



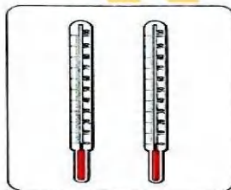
Weather map

➤ This experiment to collect data that shows differences in the effect of thermal energy from the sun on land and water, and how these differences may impact air temperature in a certain area.

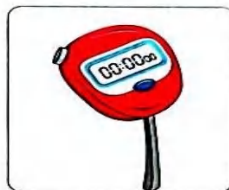
➤ Tools:



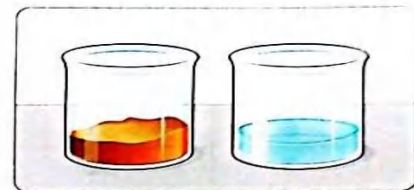
Reading lamp



Two thermometers



Stopwatch



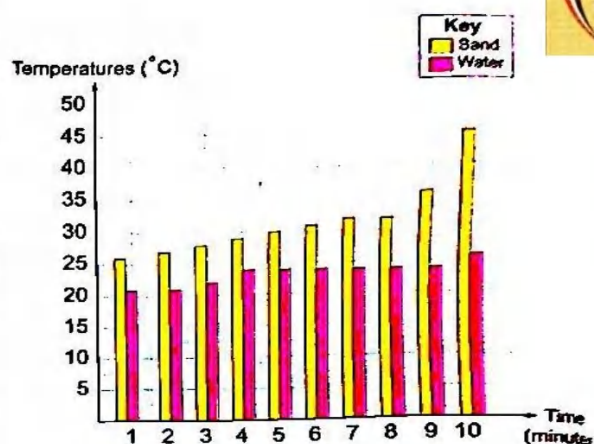
Equal amounts of sand and water in two beakers

➤ Observations :

1-When the reading lamp is on :



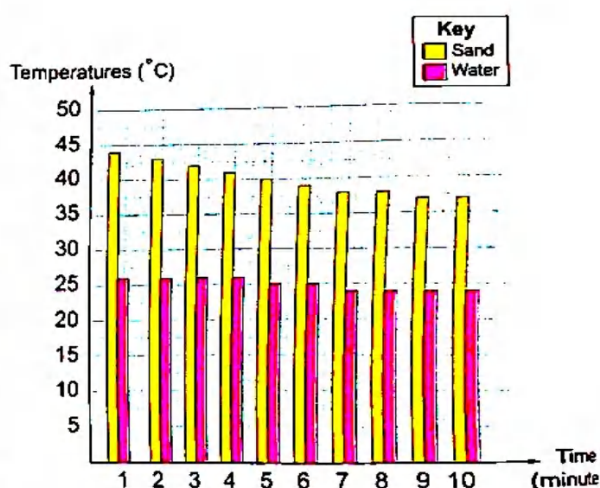
Time (minute)	Temperature of sand (°C)	Temperature of water (°C)
1	26	21
2	27	21
3	28	22
4	29	24
5	30	24
6	31	24
7	32	24
8	32	24
9	36	24
10	45	26



2-When the reading lamp is off :



Time (minute)	Temperature of sand (°C)	Temperature of water (°C)
1	44	26
2	43	26
3	42	26
4	41	26
5	40	25
6	39	25
7	38	24
8	38	24
9	37	24
10	37	24



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➤ Conclusions:

- Sand is **heated up** faster than water.
- Sand is **cooled off** faster than water.



✚ Notes :-

- When the **lamp is on**, it simulates **daylight**.
- When the **lamp is off**, it simulates **night**.
- The **effect** of thermal energy of the sun on land (sand) **differs** from that on water , and this causes the change of air temperature above land or water areas on the Earth's surface .

(Give reason:)

At noon we may not be able to stand barefoot on the sand of a beach in summer, but we can swim in the sea water?

Because sand is heated up faster than water



Concept 3.2 , lesson (3)



When air is **heated**

↓
It **expands** as its **molecules** spread out away from each other

↓
The **hot air** becomes **less dense** and **move up**.

When air is **cooled**

↓
It **contracts** as its **molecules** come close to each other

↓
The **cool air** becomes **more dense** and **move down**.

Hot air moves up , while cool air moves down?

Because hot air is less denser than cool air

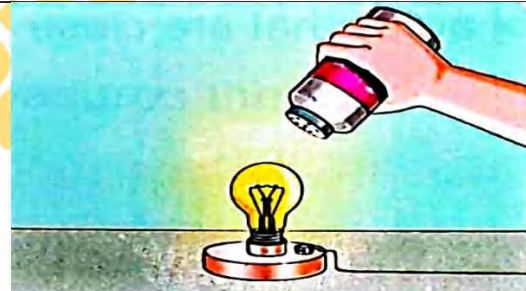
First experiment :



Sprinkle talcum **powder** over a **cool** light bulb (**turned off** light bulb)

↓
The talcum powder **spreads** and **interferes** with the **cooler**

↓
And more dense air around the light bulb.



Sprinkle powder over a **hot** light bulb (**turn on** light bulb)

↓
The powder rises above the light bulb (G.R)

Because the light bulb in this case **releases heat** , which causes the air above it to **rise** and carry the powder with it

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❖ Second experiment :



The paper spiral over a **cool** light bulb, (**turn off** light bulb)



The paper spiral **doesn't spin** that shows that the air around the paper spiral doesn't move.



The paper spiral over a **hot** light bulb (**turn on** light bulb)



the paper spiral spins (G.R)

Because the air around the paper spiral **expanded** and became **hot**

So ,the air molecules became **less dense** and **moved upward**

➤ While the **cooler** and **more dense** molecules **moved downward**

➤ Which creating a **convection current** that make the paper spiral **spins without stopping**

+ Notes :

- **Warm** air **risers up** .
- **Cold** air flows **down** and replaces the warm air.
- The **vertical** movement of air (up and down movement) is called **(air current)**
- The **horizontal** movement of air (left and right movement) is called **wind)**

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- **The differences of air temperature of areas that are close to each other on Earth affects :**

- 1- The speed of air current.
- 2- The speed of wind.
- 3- The direction of wind movement.



Tools and technology can help meteorologists make more accurate predictions about weather.

Anemometer

- It is a device used to measure the **wind speed**.



Weather radar

- It detects the **intensity and speed of precipitation** and **tracks thunderstorms and hurricanes**.



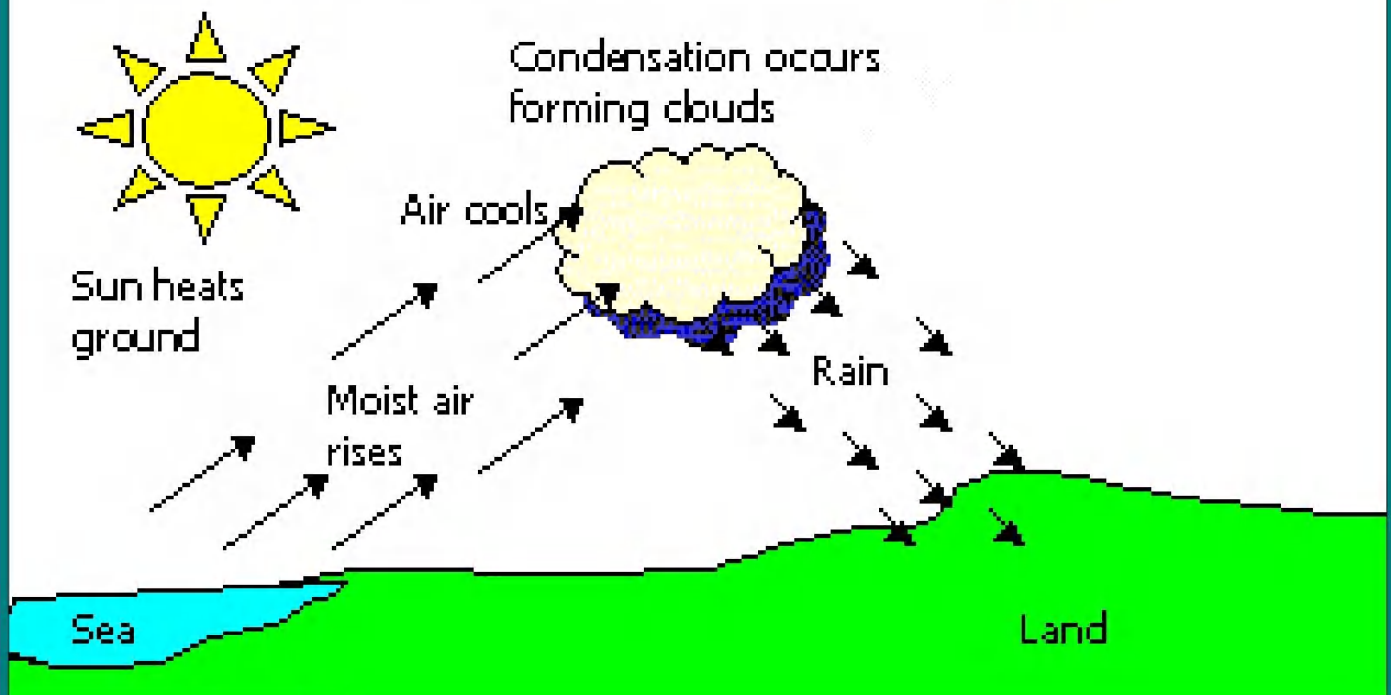
Rain gauge

- It measures the **amount of rain** in a certain area.



How precipitations occur?

- 1- Small water droplets are formed in a cloud, then air holds them up.
- 2- Water vapor condenses and the droplets become bigger and heavier.
- 3- Gravity pulls the big and heavy water droplets toward the ground, and the precipitation occurs.



Snowfall

Snow is formed when the air in clouds is cold enough to change the water droplets into ice crystals that fall to the Earth's surface in the form of snow.

Concept 3.2 , lesson (4)



-The effect of too much or too little precipitation:

- The too much or too little rain change ecosystems and may cause:
 - Damaging buildings and agricultural systems.
 - Injuries and deaths.
 - The occurrence of extreme weather phenomena such as drought and flood.

Drought	Flood
It is the shortage of water that is available for drinking, growing crops, farming animals and industry.	It is the increase in the flow of water over the edges of riverbank and onto the land around the river.
<u>It occurs when</u> an area is affected by dry weather for a long period of time due to the extreme hot temperatures, where there is not enough water for people, planets, and animals.	<u>It occurs due to:</u> -The increase in the rate of rainfall that happens every two years causes the river water to flow over the edges of the riverbank and onto the land around the river. -The sudden melting of snow and ice over a region.
	

-Notes

1. Every few decades, very extreme floods occur causing damages and loss of life.
2. Flood is more danger if the land around the flood is frozen and cannot absorb the water.

-Harms of floods:

- Damaging buildings by moving or breaking them.
- Death of people and animals.
- Harming of economy.



-Advantage of floods:

- Some ecosystems depend on periodic floods such as ecosystems along the Nile.



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-Sandstorms (dust storm):

- Sandstorm occurs when very strong winds blow up sand or dust or both of them from a dry area such as deserts.



- We can easily see sandstorms as they extend for several kilometers long, and their height may reach hundreds of meters.

Harms of sandstorms:

- 1- Dust reduces visibility during driving cars.
- 2- Dust accumulates on solar panels, so they stop generating energy.
- 3- Dust fills up irrigation canals, so the water quality decreases.
- 4- Dust damages the plane engines.
- 5- Dust harms the human eyes and respiratory system.



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موقع الدكتور محمد رزق التعليمي



امسح الباركود بالمويل لتثبيت
التطبيق وتحميل كل الملازم مجاناً وبسرعة



حمل التطبيق الآن



كورسات ونتائج امتحانات



ملازم ثانوي



ملازم اعدادي



ملازم ابتدائي



موقع الدكتور محمد رزق
Dr. Mo. RIZK



D.M.RAZK

موقع الدكتور محمد رزق معلم الكيمياء التعليمي